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Fire Risk Analysis with Fishbone Analysis Method in Surabaya Hospital

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ABSTRACT

Fire is a disaster that comes from the unwanted flame that can cause losses. Surabaya hospital is a teaching hospital and a government referral hospital that provides various medical services such as x-rays, hemodialysis, laboratory, etc. All of those services also have a risk of fire.

This research aims to analyze the hospital's policy and its compliance on fulfilling the standard regarding the prevention and the countermeasures of fire in Surabaya Hospital by using Fishbone Analysis method. This research is descriptive with cross-sectional design conducted in February 2017. The sampling technique in this research is purposive sampling technique which is two persons as informants, those are the Head Division of General Matter and the Head of Maintenance Facility Installation at Surabaya Hospital. The population is all room with the risk of fire in Surabaya Hospital. The data collection technique is using thequestionnaire in interviews and the observation checklist sheet.

The research result shows that Surabaya Hospital has already had all policy regarding the prevention and the countermeasure of fire accident (100%) and as a whole for the percentage of thesuitability of compliance regarding its fire protection system is in a good category (41,4% + 48,3% = 89,7%). But from the total fulfillment, there are around 48.3% which still not up to the regulation standard. This condition will have a big impact on the effectiveness of the fire protection system itself, just in case, the fire accident happens in Surabaya Hospital. Base on that result, Surabaya Hospital need to form cooperations with the experts of Occupational Health and Safety matter on fulfilling the fire protection system so it in accordance with the regulatory standard in Indonesia.

Keywords: *Hospital, Fire Risk*

INTRODUCTION

On Law Number 1 Year 1970 about Occupational Safety, Chapter III The Requirements of Occupational Safety, article 3 verse 1, point b and c, states that one of the requirements of occupational safety is preventing, minimizing, and extinguish the fire, also preventing and minimizing the flame hazard[25]. This regulation becomes one of the bases of the obligations to control the risk of fire and explosions.

Fire accident according to The Department of Labor is an exothermic oxidation reaction which takes place rapidly from a fuel that is accompanied by the ignition. The general definition is an event of undesirable flame, while the specific definition is an event of oxidation among three elements of the cause offire[8].

The data from the Centre of Forensics Laboratory of the Headquarter of Indonesian Police in 2001 states that 80% of fire accidents happened at the workplace, where the 34% of it is caused by open flames, 31% caused by the electricity and 20% caused by inadequate facilities such as the failure of fire protection system, untrained staffs, procedural error, and the obstacles of accessing aids[7].

The official data from United State National Fire Protection Association (US NFPA) in 2008 describes the fire accident in the United States in which the accident rate reached about 5 million times from 1999 to 2008, with a loss up to $93.426[7].

In Indonesia itself, according to the Department of Firefighter and Disaster Management, there are fire cases as many as 8.243 in Jakarta from 1998 to 2008 with a loss up to Rp 1.255.091.940.080[7]. Meanwhile, the data from the government of Surabaya District, the fire accident from 2015 was 460 cases, until early 2016 is as

many as 15-20 cases and this number can still increase since it still in the middle of the year of 2016[8].

Hospital is a health service institution that administers personal medical services in a plenary manner providing inpatient care, outpatient care, and emergency care[8]. The hospital in supporting its services is equipped with several facilities such as inpatient unit, outpatient unit, polyclinic, warehouse, medical record, chemical warehouse, and so on. But, of course, all of those existing facilities have the risk of fire. More over in the hospital which is inhabited and visited by many people who are vulnerable or the people who in need of medical services. Base on this condition, we can say that the hospital is very vulnerable or risky from disasters such as fire accident.

The fire occurred in the hospital was not a little in number, for example, the fire happened in India Hospital in Kolkata on December 9th, 2011. This accident killed 89 people and made the entire building burned. The fire was allegedly coming from short-circuiting[4].

The fire also occurred in Saudi Arabia Jazan Hospital at December 24th, 2015, precisely at the maternity room with 100 peoples injured and 25 died. On that event, where the majority of victims was in the ward, the cause of the fire was allegedly coming from electricities problem and previously the hospital disobeyed the safety standard[9].

Fire accidents occurred in Indonesia is the fire at dr. R. Soeharsono Hospital in Banjarmasin at Friday, January 1st, 2016, 00.45 WITA. The cause of fire was allegedly coming from fireworks or flare gun used by the sailors[5].

Several factors that worsen the fire accident and causing huge losses are the inadequacy of fire protection facilities, either because of the inappropriate use or the incompatibility of the fire protection system specification, also the unavailability of the experts on managing the fire.

The losses caused by the fire is very big. Not only direct losses but also can cause indirect losses such as the hospital failure on providing its services, compensation fee for the workers, and also the decrease on the image of the hospital, etc. Because of those much potential losses, there is a need for fire prevention or at least efforts to reduce the risk if the fire occurred again. Therefore, this research aims to analyze the risk of fire using fishbone analysis method in Surabaya hospital.

MATERIAL AND METHOD

Participant: This research is descriptive with across-sectional design and conducted for 1 month in February to March 2017 in Surabaya Hospital.

The population in this research is all unit rooms in the hospital that have risks of fire accident consist of anoutpatient poly room, inpatients room, nutrition room, hemodialysis room, ICU, Facilities Maintenance Installation, secretariat room, and logistic room. The sample collection on this research using purposive sampling technique amounted to two persons as an informant, those are the Head Division of General Matter and the Head of Facilities Installation and Maintenance. The data collection technique is using thequestionnaire in an interview and the observation checklist sheet.

PROCEDURE

The initial step of this research was observing each room or working unit in the hospital that at the risk

If the hospital policies have been identified, the next step is analyzing the degree of compliance of its fulfillment. To identify this matter, the researcher used checklist sheet and other research aids such as a digital camera for documentations and meter tool for measuring.

DATA ANALYSIS

In this research, to analyze the risk of fire is using the fishbone analysis method. The risk factor obtained by this method is a factor of whether the hospital policy regarding the fire prevention and management is exist or not. This policy consists of the planning, procurement, placement, and the formulation of fire team or staffs, the type and size, also the maintenance of the fire protection system components both active and passive that is useful for minimizing or managing the danger of fire.

Then it will be reanalyzed regarding the degree of compliance of the fulfillment or the implementation of the policy according to the regulation standard in Indonesia, using the step of plan-do-check-action.

FINDINGS

Overall of the OHS program that has been planned by the management in Surabaya hospital is as much as 89.7% of the 29 aspects observed. According to the level of assessment of fire audit from The Centre of Research and Development (2005), the value of 89.7% is in a good category (>80 - 100%), but from the value of 89.7% on that total fulfillment, more than a half of it is still not yet in accordance with the regulation that is 48,3% (14 aspects), meanwhile the 10% (3 aspects) observed is not available in the hospital.

More than half of the total fulfillment of evaluation at the planning and implementation stage (do), is as much as 48.3% (14 aspects) are available but not in accordance with the regulations. The first aspect including fire extinguisher that in Surabaya Hospital there are only four closed rooms which have fire extinguisher, the other observation rooms only use 3 kg of fire extinguisher which available around the area of each room and we can still find rooms with no fire extinguisher or only have the fire extinguisher sign.

The second aspect is that the fire extinguisher must be examined twice in a year, in Surabaya Hospital there are several fire extinguishers that already had a maintanance checklist sheet for monthly maintenance, but there are still fire extinguisher that has no maintenance checklist sheet.

The third aspect is that fire extinguisher need to be placed on top at 1.2 metre height from the floor surface, except CO_2 and dry flours which can be placed at lower level with a condition that the height of the bottom of fire extinguisher is not less than 15 cm from the floor surface. On this aspect, all fire extinguisher in the hospital are located on average at analtitude of ± 1 m (100 cm), but also there are fire extinguisher that is placed on the floor. The fourth aspect is the placement of fire extinguisher need to be followed by a sign or symbol. On this aspect, the majority of fire extinguisher placement in the hospital have been followed by a sign or symbol of fire extinguisher.

The fifth aspect is the marking of fire extinguisher symbol must be 125 cm from the floor just above the one or several fire extinguisher. On this aspect, the position of sign/symbol of fire extinguisher in the hospital is varied with an average height of ± 130 cm. The sixth aspect is the availability of the sprinkler in the room and in the hospital area. On this aspect, the sprinkler was centralized installed on the new hospital building amounted to ± 24 sprinklers.

The seventh aspect is the installation of fire detector or the fire alarm in hospital area. On this aspect, the detector (smoke detector) only installed in the area of new building of the hospital, and the alarm that is installed in the polyclinic is as many as two and one in front of the Operating room. The eight aspect are the availability of evacuation route in the hospital area. On this aspect, the hospital has 3 exit doors, 1 emergency stair made from oak which will be very vulnerable in case of fire, also 1 ramp made of casted concrete.

Next, the ninth aspect is that all of the exit doors are not blocked. On this aspect, the hospital's exit door is blocked by used stuff from each room, staff's motorcycles and also it is locked. The tenth aspect is that the availability of assembly point, a designated area in the hospital which are to be used in the case of emergency situations. On this aspect, the hospital has 1 assembly point located in front of the main entrance which is a car park so it is not appropriate if that place used as assembly point in the case of fire because it always filled with car every day. The eleventh aspect is that all exit route are clearly visible and marked. For this aspect, almost all the exit marks are made of acrylic, but there are several signs which still usea laminated print and prints have faded so it is not clear when there is an emergency.

The twelfth aspect is the wiring system that must be well organized and in a good condition. On this aspect, almost in all observation areas the electrical wires are found scattered, either from portable or from the installation of electrical connections.In portable condition, almost all of it is not feasible to wear and some are not up to the Indonesia National Standard. The thirteenth aspect is that flammable substances need to be specially placed and labeled with a danger sign. On this aspect, the hospital has boxes made of glass and plastic for storing hazardous and toxic materials and already have the danger sign, but the label that is used for that matter only explains the danger of those materials and about the type and nature of the material is unexplained.

The fourteenth aspect is about the fire team and the structure of its member. On this aspect, the Surabaya

Hospital has the structure of fire management team and for the preparedness and disaster & fire prevention sections are established in the structure of the Hospital OHS Committee, all of which are contained in the Director's Decree. The fire team members are appointed directly from the employees in the area according to the room. Surabaya Hospital does not have a fire prevention experts who is appointed as the person in charge for the technical matter in the case of fire. In the case of fire, the command comes directly from the Director of the hospital as the Disaster Commander of the Hospital along with the fire coordinator led by the head of the disaster & fire coordinator.

Then as much as 10% (3 aspects) of the total fulfillment of evaluations at the stages of planning & implementation, which are not available in the hospital include sprinkler which is examined or supervised periodically. For this aspect, there is no document or checklist of sprinkler checks. The next aspect is fire detectors or fire alarms are tested periodically. In this aspect, there is no document or checklist of inspection results on smoke detectors and fire alarms. The last aspect is that emergency lights are available and functioning well. In this aspect, no emergency lamps are specially used in case of fire.

CONCLUSION

Overall research result indicates that Surabaya Hospital is very at risk of fire. Efforts to minimize the hazards of fire risks, it is expected that the hospitals implement the fulfillment of existing fire protection systems and adjusted to the regulation standards in Indonesia. Then perform the risk management extensively in every area of the hospital.

Conflict of Interest: None

Source of Funding: Self

Ethical Clearance: The study was approved by the institutional Ethical Board of the Public Health, Airlangga University.

All subjects were fully informed about the procedures and objectives of this study and each subject prior to the study signed an informed consent form.

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